

Conference Program

Sunday Evening Introduction

7:30 pm-10:30 pm

Session Chairs: N.R. Moody, Sandia National Laboratories, Livermore, CA, USA
A.W. Thompson, Lawrence Berkeley Laboratory, Berkeley, CA, USA

Reflections on Hydrogen Conferences

A.W. Thompson (USA) (Welcome Address)

Mechanisms of Hydrogen Assisted Cracking-A Review

S.P. Lynch (Australia) (Invited)

Hydrogen Assisted Cracking of Quenched and Tempered 4135 Steel in an Hydroxide Solution

É. Verniquet, R. Roberge, S. Lalonde, J.I. Dickson (Canada)

Vacancy Generation in Electrochemical Oxidation of Copper in NaNO₂ Solutions and its Role in TGSCC Mechanisms

P. Aaltonen, Y. Yagodzinsky, O. Tarasenko, H. Hanninen (Finland)

Advanced Materials for hydrogen Storage

G. Thomas (USA)

A Mechanism of the Hydrogen Embrittlement of Cr-Ni Austenitic Steels and Alloys at High Pressures and Temperatures

Yu I. Archakov (Russia)

Monday Morning Hydrogen Effects on Material Behavior

8:30 am-12:30 pm

Session Chairs: P. Sofronis, University of Illinois, Urbana, IL USA
S.L. Robinson, Sandia National Laboratories, Livermore, CA, USA

Hydrogen Interactions with 2.25Cr and 9Cr Steels

H. Hänninen, Y. Yagodzinsky, O. Tarasenko, P. Castello, J.-P. Schosger (Finland)
(Invited)

Probing Hydrogen - Deformation Interactions Using Nanoindentation

D.F. Bahr, K.R. Morasch, C.L. Woodcock, D.P. Field (USA)

Effects of Hydrogen on Slip Character in a Precipitation-Strengthened Alloy

A.W. Thompson, D.C. Nguyen (USA)

Examination of Deformation Microstructures in Hydrogen Embrittled Commercial Alloys

D.S. Gelles, R. Bajaj (USA)

Break for Poster Session I

Effects of Hydrogen Isotopes on the Fracture Toughness Properties of Austenitic Stainless Steel Weldments

M.J. Morgan, S.L. West, M.H. Tosten, G.K. Chapman (USA) (Invited)

Tritium Decay, Irradiation and Hydrogen/Helium Effects on Austenitic Stainless Steels

M.R. Louthan, Jr. (USA)

Effect of Environmental Hydrogen on Tensile Properties of Inconel 690

X.-H. Luo, M. Habashi (China)

Monday Evening

Permeation, Segregation, and Fracture

7:30 pm-10:30 pm

Session Chairs: M. I. Baskes, Los Alamos, National Laboratory, Los Alamos, NM, USA

R. Schwarz, Los Alamos, National Laboratory, Los Alamos, NM, USA

Hydrogen Segregation at Dislocations, Grain- and Phase-Boundaries

R. Kirchheim (Germany) (Invited)

Hydrogen Diffusion and Trapping in Low Alloy High Strength Steels

A.M. Brass (France) (Invited)

Local Hydrogen Uptake in Stationary and Propagating-Real and Model Crack Tips

J.R. Scully, D.G Kolman, G.A. Young, Jr., L.M. Young, R.P. Gangloff (USA) (Invited)

Analyses for the Rate Constants of the Hydrogen Absorption/Evolution Reactions for

Both Langmuir and Frumkin Conditions

H.W. Pickering, F. M. Al-Faqueer (USA)

Break

Role of Hydrogen in Stress Corrosion Cracking of Low Strength Al-Mg

R.H. Jones, M.J. Danielson (USA) (Invited)

Hydrogen Effects on Grain Boundary Fracture During SCC in Al-5Mg: Critical

Experiments and Atomistic Computer Simulations

D. Tanguy, B. Bayle, T. Magnin (France)

Irreversible Hydrogen Trapping in High-Strength Alloys

B. Pound (USA)

Tuesday Morning

Hydrogen Induced Cracking

8:30 am-12:30 pm

Session Chairs: J.R. Scully, University of Virginia, Charlottesville, VA, USA

D. Eliezer, Ben Gurion University of the Negev, Israel

Hydrogen Embrittlement: Plasticity vs Decohesion Mechanisms

I.M. Robertson (USA) (Invited)

Functions of Microstructures in Delayed Fracture of Martensitic Steels

M. Nagumo, T. Tamaoki, T. Sugawara (Japan)

Structures and Their Effects on Deformation, Fracture and Fatigue-Behavior of Zr-Ti-Ni-Cu-Be Bulk Metallic Glass Alloys

D. Suh, R.H. Dauskardt (USA)

Analysis of Hydrogen Related to Embrittlement of an Al-Zn-Mg-Cu Alloy

J. Okahana, S. Kuramoto, M. Kanno (Japan)

Break

A Perspective on Corrosion and Corrosion Fatigue

R.P. Wei (USA) (Invited)

The Sour Gas Susceptibility of Steels for Oil and Gas Transport

J.L. Albaran, S. Serna, G. Gonzalez, L. Martinez (Mexico)

Diffusion Coefficients and Hydrogen Assisted Crack Growth

M. Pfuff, G.G. Juilfs, W. Dietzel (Germany)

Hydrogen Induced Intergranular Stress Corrosion Cracking in Nickel Based Alloys 600 and 690 Under High Temperature Water/Steam

H.F. Lopez, A. Mehboob, J.L. Albaran, L. Martinez (USA)

Interactions Between Previous Cyclic Deformation and Stress Corrosion Cracking in Cold Drawn Steel

J. Toribio, V. Kharin, E. Ovejero (Spain)

Tuesday Afternoon

Stress Corrosion Cracking

1:30 pm-5:00 pm

Session Chairs: R.P. Gangloff, University of Virginia, Charlottesville, VA, USA

R.H. Jones, Pacific Northwest National Laboratory, Richland, WA, USA

Overview of Corrosion Deformation Interactions During Stress Corrosion Cracking and Fatigue Cracking

T. Magnin, D. Delafosse, B. Bayle, C. Bosch (France) (Keynote)

The Increment of Hydrogen-Induced Corrosion Fatigue Crack Growth per Cycle:

Comparing Theory and Experimental Data

S.A. Shipilov (Canada)

A Comparison of Short Fatigue Crack Growth (SFCG) Rates in a Medium Strength Steel Under In-Air and Corrosion Fatigue Loading Conditions

H. Hu, R. Akid (United Kingdom)

Break

IGSCC Behavior of CSL-Related and High Angle Boundaries in Ni-16Cr-9Fe-xC Alloys

B. Alexandreanu, G.S. Was (USA)

Developments in Stress Corrosion of Solid-Solution Alloys

R.C. Newman, J. Deakin, B. Lynch (UK) (Invited)

Modeling the Influence of Crack Path Deviations on the Propagation of Stress Corrosion Cracks

R.E. Ricker (USA)

Wednesday Morning Hydrogen Interactions

8:30 am-12:30 pm

Session Chairs: R. Kirchhiem, Universitat, Gottingen, Gottingen, Germany
J.A. Brooks, Sandia national Laboratories, Livermore, CA, USA

Thermodynamics of Two-Phase Systems with Coherent Interfaces: Application to Metal-Hydrogen Systems

R.B. Schwarz, A.G. Khachaturyan (USA) (Invited)

Structure Dependence of Hydrogen Effects at Grain Boundaries in an FCC Solid

M.I. Baskes, R.G. Hoagland (USA) (Invited)

The Vibrational, Elastic, and Electronic Contributions to the Chemical Potentials of Hydrogen Isotopes in Palladium

W.G. Wolfer, B. Meyer (USA)

Elastic Properties of Pd-Protium, Pd-Deuterium, and Pd-Tritium Single Crystals

H. Bach, R.B. Schwarz, D. Tuggle (USA)

Break for Poster Session II

Numerical Study of Microstructural Evolution in Low Alloy Cr-Mo Steels During Hydrogen Attack

S.M. Schlogl, E. van der Giessen (The Netherlands)

Migration and Trapping of Hydrogen in Martensitic Steels-Effect of Irradiation and Helium Implantation

P. Jung, Z. Yao, C. Liu (Germany)

Hydrogen Effects on Multi-Vacancy Formation in Alpha-Fe

Y. Tateyama, T. Ohno (Japan)

Wednesday Evening Hydrides and hydrogen Processing

7:30 pm-10:30 pm

Session Chairs: W.W. Gerberich, University of Minnesota, Minneapolis, MN, USA
B. C. Odegard, Sandia National Laboratories, Livermore, CA, USA

The Effect of Applied Stress on the Accommodation Energy and the Solvi for the Formation and Dissolution of Zirconium Hydride

M.P. Puls, B.W. Leitch, S.-Q. Shi (Canada) (Invited)

Influence of a Hydrided Layer on Fracture of Zircaloy-4 Cladding

R.S. Daum, D.W. Bates, D. A. Koss, A.T. Motta (USA)

Uranium Hydride Nucleation Kinetics: Effects Of Oxide Thickness And Vacuum Outgassing

D.F. Teter, R.J. Hanrahan, Jr., C.J. Wetteland (USA)

Break

Crack Initiation by Delayed Hydride Cracking at Sharp Notches in Zr-2.5 Nb Alloys

S. Sagat, G.W. Newman, D.A. Scarth (Canada)

Hydrogen-Assisted Metal Processing

D. Eliezer, N. Eliaz, D. Zander, D.L. Olson (Israel) (Invited)

Beneficial Effects of Hydrogen as a Temporary Alloying Element in Titanium Alloys: An Overview

F.H. Froes, D. Eliezer, O.N. Senkov, J.J. Qazi (USA) (Invited)

Thursday Morning

Fundamental Effects of Hydrogen in Materials

8:30 am-12:30 pm

Session Chairs: M.R. Louthan, Westinghouse Savannah River Company, Aiken, SC

M. Puls, Atomic Energy of Canada, Mississauga, Ontario, Canada

Crack Tip Hydrogen Damage in High Performance Alloys

R.P. Gangloff, J.R. Scully (USA) (Invited)

Hydrogen-Induced Changes of the Mechanical Properties of Beta-Titanium Alloys—Intrinsic and Extrinsic Effects

H.-J. Christ, K. Prüßner, A. Senemmar, M. Decker (Germany)

Hydrogen Influence on Plastic Deformation of Stable 18Cr-16Ni 10Mn Austenitic Stainless Steel Single Crystals

Y. Yagodzinsky, O. Tarasenko, H. Hanninen (Finland)

SSRT and Modelling of Hydrogen Assisted Crack Growth in Super Martensitic Stainless Steels

T. Boellinghaus (Germany)

Break for Poster Session III

Some Recent Advances at Illinois in Hydrogen Induced Shear Localization and Decohesion P. Sofronis, I.M. Robertson, Y. Liang, D.F. Teter, N. Aravas (USA) (Invited)

Hydrogen Effects on Mechanical Responses of Small Volumes

W.W. Gerberich, N.I. Tymak, J. Jungk, T. Wyrobek (USA) (Invited)

Dueterium-Induced Interfacial Fracture of Beryllium Films

N.R. Moody, R.A. Causey, D.F. Bahr, K.L. Wilson, W.W. Gerberich (USA)

Thursday Evening

High Temperature Stress Corrosion Cracking

7:30 pm-10:30 pm

Session Chairs: R.E. Ricker, NIST, Gaithersburg, MD, USA

G. Was, University of Michigan, Ann Arbor, MI, USA

Interactions of Hydrogen with Moving Dislocations in Nickel and Nickel Base Alloys-
Consequences on the Intergranular Rupture

J. Chêne, A.M. Brass (France) (Invited)

The Effect of Hydrogen on Creep in High Purity Ni-16Cr-9Fe Alloys at 360°C

D.J. Paraventi, T.M. Angelius, G.S. Was (USA)

Constitutive Deformation Model for Analysis of Stress Corrosion Crack Tip Strain Rates
in Ni-Cr-Fe Alloy 600

M.M. Hall, Jr., D.M., Symons (USA)

Break

Some Uses of Slow Strain Rate Testing Under Applied Potential Control in Studying
SCC of Materials Used in Nuclear Power Plant

J. Congleton, E.A. Charles (United Kingdom) (Invited)

Hydrogen Dislocation Interactions During Cyclic Plastic Deformation and Static Strain
Ageing Tests in Single Crystals and Polycrystals of Ni and Its Alloys

C. Bosch, G. Girardin, D. Delafosse, T. Magnin (France)

Oxidation Induced Intergranular Cracking in Nickel Base Alloys in the Temperature
Range 400°C to 600°C

L. Fournier, B. Capell, T. Magnin, G.S. Was (USA)

Poster Presentations

Poster Session I (Monday)

The Protective Effect of Glassy and Glass Ceramic Coatings in the Processes of the
Hydrogen-Steel Interactions at High Temperatures-High Pressures

I. Yu. Artchakov, B.Z. Pevzner, V.G. Konakov, T.D. Alyferenko (Russia)

Effect of the Density of States on the Stacking Fault Energy and Hydrogen
Embrittlement of Transition Metals and Alloys

J.A. Lee (USA)

Hydrogen Embrittlement and Mossbauer Effects

J. Vosta, P. Sajdl, O. Schneeweiss, R. Novotny (Czech Republic)

The Effects of Neutron Damage on the Migration Parameters of Hydrogen Isotopes in
CVD Silicon Carbide

R.A. Causey, L.L. Snead, T.J. Venhaus, W.R. Wampler (USA)

The Influence of Hydrogen on the Dislocation Velocity in Ni_3Al Single Crystals

C. B. Jiang, H. Li, S. D. Wu, S. Patu (China)

Multi Layer Blister Formation in Structural Materials Due to Hydrogen and Helium Implantation

D. Moreno, D. Eliezer (Israel)

Modeling of Hydrogen Diffusion in Amorphous Alloys

N. Eliaz, D. Fuks, D. Eliezer (Israel)

Visualization of Hydrogen Desorption Process from Ferrite, Pearlite and Graphite by Secondary Ion Mass Spectrometry

K. Takai, Y. Chiba, A. Nozue (Japan)

The Influence of Plastic Strain on the Hydrogen Diffusion in an HSLA Steel

G.G. Juilfs, W. Dietzel, M. Pfuff (Germany)

Quantitative Visualization of Hydrogen Evolved from Steels by Hydrogen Microprint Technique

K. Ichitani, S. Kuramoto, M. Kanno (Japan)

Irreversible Hydrogen Traps in High Strength Steel Weld Metal

C. Lensing, I. Maroef, D.L. Olson (USA)

The Mechanical Instability of Amorphous Metal Alloys Appearing under Hydrogenation

N.E. Skryabina, L.V. Spivak, A.S. Petrov (Russia)

Environmental Factors on Embrittlement of Vitreous Silica Fibers

K. Takai, D. Yamada, A. Nozue (Japan)

Mechanical Stresses and Strains Developing in Thin Y-Films Due to H-Absorption

M. Dornheim, A. Pundt, R. Kirchheim (Germany)

Monitoring of the Distribution and Desorption of Residual Tritium From Radioactive Waste After Detritiation

A.M. Brass, J. Chêne, S. Rosanvallon (France)

Estimation of Internal Hydrogen Pressure in Metal Cavities Based on the Thermodynamics Approach

I. Skrypnyk (Ukraine)

Factors Affecting the Hydrogen Environment Assisted Cracking Resistance of an Al-Zn-Mg-(Cu) Alloy

G.A. Young, J.R. Scully (USA)

Hydrogen Interactions with Aluminum Surfaces

R. Bastasz, J.A. Whaley (USA)

Corrosion Fatigue of Riveted Joints with LY12CZ Aluminum Alloy in 3.5% Sodium Chloride Solution

E-H. Han, B. Zhang, Z.G. Zhang, W. Ke (China)

Hydrogen Embrittlement of Al 2195 Alloy

E.I. Meletis (USA)

The Influence of Grain Boundary Precipitation on the Stress Corrosion Cracking of Al-Li and Al-Li-Cu Alloys

R.E. Ricker, A.K. Vasudevan (USA)

Poster Session II (Wednesday)

Hydrogen Isotope and Microstructure Effects on Deformationand Fracture in 22Cr-13Ni-5Mn

B.P. Somerday, C.H. Cadden, S.L. Robinson (USA)

Materials Testing in High-Pressure Gaseous Hydrogen at Sub-Zero Temperatures

M. Watwood, B. Hurless, M. Jackson, S. Gentz (USA)

Relationship of Laboratory Tests of Rock Bolt SCC to Service Failures

E. Gamboa, A. Atrens (Australia)

Effect of Microstructure and Electrochemical Potential on the SCC Resistance of X-80 Steel in Diluted NaHCO₃ Solutions

J.G. Gonzalez-Rodriguez, M. Casales, V.M. Salinas-Bravo, J.L. Albarran, L. Martinez (Mexico)

Numerical Simulation of Hydrogen Effects on Stress Corrosion Crack-Tip Plasticity

D. Delafosse, J. P. Chateau, S. Teyssere, T. Magnin (France)

Factors Influencing Stress Corrosion Cracking of Mild Steels in Alcoholic Environments

E. Risson, B. Bayle, R. Kefferstein, T. Magnin (France)

Effects of Strain Rate and Hydrogen Trapping Behavior on Fatigue Crack Growth of SA 508C1.3 Pressure Vessel Steel in High Temperature Water

S.G. Lee, I.S. Kim (Korea)

Reproducibility and Repeatability of Tensile and Low Cycle Fatigue Properties in Propulsion Grade Hydrogen

E.J. Vesely, B.N. Bhat, W.B. McPherson, C.E. Grethlein (USA)

Stress Corrosion Cracking and Life Prediction of Austenitic Stainless Steels in Calcium Chloride Solution

H. Leinonen, I. Virkkunen, H. Hanninen (Finland)

Surface Work Hardening and Stress Corrosion Cracking of an Austenitic Stainless Steel

C. Braham, A. Bouzina, J. Lédion (France)

Effect of Nitrogen on the SCC of 316LN Weld Metal

S.N. Soman, V.J. Gadgil, S.N. Malhotra, R. Raman, V.S. Raja, S.D. Kulkarni (India)

Effects of Thermohydrogen Processing on Microstructure and Properties of Uranium Alloys

M.B. Shuai, Y.J. Su, D.M. Lang, Z.H. Wang, P.J. Zhao, S. Wu (China)

Phase Transformations in Ti-6Al-4V-xH Alloys

J.I. Qazi, J. Rahim, O.N. Senkov, S.N. Patankar, F.H. Froes (USA)

Influence of Hydrogen on the Stability in Ti-Nb alloys

D. Zander, B. Kofmann, D. Eliezer, E.Y. Gutmanas, E. Abramov, D. Olson (Israel)

How Helium Affects the Thermodynamics of the Palladium-Tritium System

S.E. Guthrie, W.G. Wolfer (USA)

Improved Thermal Stability by Hydrogenation of Zr-Cu-Ni-Al Metallic Glasses and Quasicrystals

D. Zander, D. E. Beduli, D. Eliezer, N. Eliaz , U. Köster (Israel)

Effect of Hydrogen on Deformation of Ni in Crack Tip Model

M. Wen, X. Xu, S. Fukuyama, K. Yokogama (Japan)

Effect of Applied Stresses on Hydride Orientation in Titanium

A. Politis, M.I. Lupo, G. Vigna (Argentina)

Hydrogen Effects on a Microalloyed X70 Linepipe Steel

A. Hazarabedian, P. Bruzzoni, R.J. Cordoba, N. Mingol, M. Ortiz, M.I. Lupo, G. Anteri, J. Ovejero-Garcia (Argentina)

Comparison of Hydrogen Effects on the Behavior of C-Mn Steels by Different Methods

J. Sojka, P. Betakova, I. Schindler, L. Hyspecka, M. Sozanska, C. Dagbert, J. Galland, M. Tvrdy (Czech Republic)

Doping Influence on the Kinetics of Hydride Decomposition in Titanium Alloys

LG. Malyshev, V.G. Shamruk (Russia)

Poster Session III (Thursday)

The Investigation of Hydrides in Uranium with Small Angle Neutron Scattering

J.S. Bullock, S. Spooner, R.L. Bridges, G.L. Powell, G.M. Ludtka, J. Barker (USA)

A Mechanistic Model of Helium Retention and Release for Aging Metal Tritides

D.F. Cowgill (USA)

Interactions Between Sodium Alanate Metal-Hydride and Candidate Containment Materials

E.H. Majzoub, B.P. Somerday, S.H. Goods, K.J. Gross (USA)

Microstructure, Stress and Mechanical Properties of Sputtered Rare Earth Metal and Rare Earth Metal Hydride Thin Films

D.P. Adams, N.R. Moody, J.A. Romero, J. Floro, M. Rodriguez (USA)

Hydrogen Assisted Fracture in LENS™ 316 Stainless Steel

B.P. Somerday, J.E. Smugeresky, J.A. Brooks (USA)

Nanomechanical Evaluation of Hydrogen Affected Deformation and Fracture in Stainless Steels

N.I. Tymiak, A. Daugela, J. Jungk, Y. Katz, W.W. Gerberich (USA)

Role of Heat Treating on the Sour Gas Susceptibility of an X-80 Steel

H.F. López J.L. Albarran, L. Martinez (Mexico)

On the Heat Treatment and Microstructure in the Intergranular Stress Corrosion Cracking Response of Alloy 600

A. Aguilar, H.F. Lopez, L. Martinez, J.L. Albarran (Mexico)

Effect of Temperature, Strain Rate and Microstructure on the Tensile Properties of Hydrogen Charged Nickel and Alloy 600

A.M. Brass, J. Chêne (France)

Kinetic Features of Metal Hydride Decomposition in Nonisothermal Conditions

L.G. Malyshev, V.G. Shamruk (Russia)

Thermo-Oxidation Degradation in Cyanate Ester Resins

A. Venkatramanian, Z. Liu, J.P. Lucas (USA)

The Initiation and Propagation of The Stress Corrosion Cracks in High Temperature and High Pressure Conditions

R. Novotny, P. Sajdl, J. Vosta (Check Republic)

Study of Hydrogen Embrittlement Sensibility in Low Alloyed Steels Towards Critical Tests for Classification

B. Bayle, C. Bosch, X. Longaygue, T. Magnin (France)

The Interpretation of Wave Shape Effects During the Corrosion Fatigue of Anodically Polarised Steel in Sea Water

C.J. van der Wekken, M. Janssen (The Netherlands)

Hydrogen Cracking and Stress Corrosion Cracking of Pipeline Steels

D. Le Friant, B. Bayle, T. Magnin (France)

Tensile Behavior of Austenitic Stainless Steels in Hydrogen Atmosphere at Low Temperatures

S. Fukuyama, D. Sun, L. Zhang, M. Wen, K. Yokogawa (Japan)

The Influence of the Surface layer of the Carbon Steel While Its Cycle Deforming on the Hydrogen Absorption and Fatigue Strength

V.A. Slezkin, S.M. Beloglazov (Russia)

Fatigue Behavior of the High Strength Steel SE702 in Vacuum, Air and NaCl Solution

B. Huneau, J. Mendez (France)

Moisture-Induced Embrittlement of B2-type CoTi Ordered Intermetallics

Y. Kaneno, T. Takasugi (Japan)

Evaluation of Electrolytic Hydrogenation Influence on Fatigue Crack Growth Resistance of High-Strength Steels.

A.I. Balitskii, V.I. Pokhmurskii, O.O. Krohmalny,

Prevention of Hydrogen Embrittlement and Corrosion of Steels in Aqueous Salt Media with SRB by Industrial Organic Additives

S.M. Beloglasov, A.A. Myamina, E.M. Kondrasheva (Russia)